APPENDIX A

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ENTERPRISE DIRECTORATE-GENERAL
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Mechanical and electrical equipment (including telecom terminal equipment)
TCAM Secretariat
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RADIO SPECTRUM COMMITTEE

Working Document

Subject: **Broadband communications through powerlines**

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Introduction

Powerline Communication (PLC) systems have the potential to provide an alternative broadband infrastructure competing with local fixed telephony and cable networks. A faster roll-out of competitive broadband infrastructure will contribute to achieve the ten-year goal set at the Lisbon European Council for the EU to become the most competitive and dynamic knowledge-based economy in the world and, in this context, to achieve the commitment in the *e*Europe action plan for greater competition in local access networks.

The debate about PLC has been centred on interference aspects. However, assessments made using radio-regulatory interference models developed to co-ordinate between radio systems may not be appropriate. PLC as a guided medium has different interference properties, typically with larger statistical variations. Modern PLC systems do not seem to give rise to the same interference problems that characterised the first generation PLC systems and are flexible to adapt to interference situations, if and when such situations arise.

PLC cuts across the field of expertise and responsibility of different regulators and authorities and its deployment depends on overcoming regulatory barriers and finding a new balance between the interests of existing players and new entrants, allowing a co-existence of users of radio and guided media with the least possible restrictions on either side. This will need to include consideration of, on the one hand, the potential contribution of PLC towards realising the Lisbon goals, and, on the other hand, the need to avoid interference with existing services, in particular radio services.

This Working Document was developed by DG Information Society and DG Enterprise to allow an exchange of view on the barriers that are currently holding up the deployment of PLC services in the EU and to explore ways to achieve the co-existence of PLC systems with other systems.

Organising a dialogue for change

In order to address current regulatory barriers, dialogue is needed with the regulators and authorities involved in the Member States, including radio regulators, EMC regulators, product regulatory and market surveillance authorities, national regulators responsible for electronic communications and broadcast regulators. It should also involve policy makers responsible for promoting economic expansion and development of the sector.

The attached Working Document serves as a point of departure for an exchange of views with national regulatory authorities and other government bodies involved in the various facets surrounding the deployment and operation of PLC.

The Working Document will be presented to the Radio Spectrum Committee on 28 May, the Communications Committee on 11 June, and to a special meeting of the EMC Working Party to be held in conjunction with the Telecommunication Conformity Assessment and Market surveillance committee (TCAM) on 24 – 25 June with a view to holding a joint workshop of regulatory experts in September. This workshop is designed to allow for discussion on PLC technologies, interference models and practical

experiences. PLC providers and other stakeholders will be invited to contribute to this workshop.

To the extent that this wide-ranging dialogue with Member States results in a general consensus, the Commission could consider adoption of a Recommendation towards the end of the year. The legal basis for the Recommendation would be Article 19 of the new Framework Directive.

Working Document

on

Broadband communications through powerlines

Introduction

The Lisbon European Council in 2000 set as a ten-year goal for the EU to become the most competitive and dynamic knowledge-based economy in the world. To achieve this goal, the Commission devised the *e*Europe action plan which integrates the key commitment to achieve greater competition in local access networks.

In the pursuit of the Lisbon goal, the Council and the European Parliament adopted on 18 December 2000 Regulation No 2887/2000 on unbundled access to the local loop. However, within the EU as a whole, the development of broadband services is still hindered by the very limited infrastructure competition, especially in the local loop. Cable networks, that also offer broadband services, are widespread in only certain Member States.

New parallel infrastructures can serve to enhance competition in the fixed broadband services market but building new parallel local loop infrastructures requires substantial investment. As a result the barriers for new entrants not already owning such an infrastructure to offer competitive fixed broadband services are high.

Powerline communications has the potential to offer ubiquitous broadband service offering, including in the enlargement countries where fixed telecommunication networks are less developed, in a reasonable time period by using existing cabling and other infrastructures currently providing electrical power. Broadband services delivered over powerline networks are generally comparable in speed and quality to those currently offered by DSL and cable distribution networks.

Similar technology can also be applied within a building, but in-house applications are outside the scope of the paper.

Legal framework governing the co-existence of powerline communications with radio communications and other devices and systems

Practical experience with modern powerline communications in Europe and in the rest of the world have demonstrated the capability of powerline communications networks to co-exist with radio communication services. However, the further development of powerline communications remains hampered by specific concerns related to the compatibility of powerline communication networks with existing radio services notably in the bands from 1,6 MHz up to 30 MHz.

Powerline communication networks are guided media and as such they are installations in the sense of the EMC Directive[1]. Under this Directive, operators of powerline communications networks need adequately to protect radio communications and other devices and systems which might be disturbed or whose performance might be degraded. Provided that they give such protection, they are allowed under the Directive to be put into service and to operate.

Operators can demonstrate compliance with the EMC Directive by conforming to harmonised standards. In fact, when conforming to such standards, they are presumed to comply with the EMC Directive. To this end, the Commission mandated in 2001 the European Standardisation Organisations to draft harmonised standards for networks, which would include DSL, Ethernet and PLC networks. Once agreed, the harmonised standards would provide legal certainty to powerline communications operators whilst serving as a basis for authorities in the case of interference resolution and enforcement.

Unfortunately, in the standard making process positions have not converged yet, and regulatory uncertainty remains. In fact, in the absence of such standards providing an agreed technical expression for the essential requirements of the EMC Directive for telecommunications networks, these essential requirements may be interpreted differently between Member States.

This regulatory uncertainty can damage the interests of an emerging industry and also the wider interests of society and the economy for having a competitive supply of broadband services.

In order to converge on technical requirement within standards paving the way towards regulatory certainty, there is a need to enhance the information available to interested parties through further gathering of field measurements and to feed the standardisation process with relevant information. In view of the concerns of radio communications users, it will be particularly important to ensure that adequate and timely information is exchanged and to strengthen the dialogue with the radio communications community.

The need for an appropriate interference model and measurement technique

Equipment standards laying down EMC technical requirements for IT equipment (including PLC equipment), and which are revised to take into account the specificity of PLC, are based today on the measurement of conducted emission and on a simple modelling of telecommunication networks.

However, because of the complexity and uncertainties surrounding the conducted measurement method, the typical statistical variations and the lack of representativeness of this method for assessing interference situations between PLC and other systems, and the need to create a favourable approval environment with easy market surveillance and compliance verification, there is concern about the use of today's method for modelling the EMC effects of powerline communication networks. It would seem appropriate to

[1] Council Directive 89/336/EEC of 3 May 1989 on the approximation of laws of the Member States relating to electromagnetic compatibility, OJ L 139, 23.5.1989, p.19, as last amended by Directive 93/68/EEC (OJ L 220, 30.8.1993,p.1)

consider adopting an interference model based on radiated measurements, made on an open field site and performed at different installations that can be demonstrated to be representative of typical installation sites. This implies a new way to establish whether or not interference is caused within the meaning of the Directives, and the associated technical requirements that would determine electromagnetic compatibility for apparatus.

Creating a favourable regulatory environment to enable new solutions for broadband communications

The current liberalisation of the energy market and the interest of utility companies to deliver broadband telecommunications services present an opportunity to promote competition in the local loop and the supply of broadband services. For this to happen, the remaining regulatory uncertainty needs to be removed expeditiously, creating stable conditions that could encourage investments in technologies like powerline communications.

The Commission and the Member States need to ensure a regulatory level playing field and technology neutrality, taking into account the Lisbon goals and in that context the overall interests in a new infrastructures for the provision of broadband services as well as the interests of existing radio users in the bands affected. It will then be for the market to decide whether this technology succeeds.

Possible orientations

On the basis of the above considerations, Member States should be encouraged to allow the deployment of powerline communications networks in their country.

2. The deployment of powerline communications networks can be subject only to a general authorisation in accordance with Authorisation Directive[2], including where appropriate any obligations in accordance with the EMC Directive and the Framework[3] and Universal Service Directives[4] (see point 4 below). As a powerline communications system operates over a guided medium, networks do not use radio frequencies for transmission, within the meaning of the Authorisation Directive, and therefore the conditions in part B of the Annex to the Authorisation Directive do not apply.

3 Powerline communication networks are guided media and as such are installations in the sense of the EMC Directive which consequently provides the basic legal framework. This framework ensures that the interests of radio users are taken into

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Directive 2002/20/EC of the European Parliament and of the Council of 7 March 2002 on the authorisation of electronic communications networks and services

Directive 2002/21/EC of the European Parliament and of the Council on a common regulatory framework for electronic communication networks and services, 7 March 2002, OJ L 108/33

4 Directive 2002/22/EC of the European Parliament and of the Council on universal service and users' rights relating to electronic communication networks and services, 7 March 2002, OJ L 108/51

account. The EMC Directive requires Member States to resolve problems with interference between PLC and other systems. Given that radio users co-ordinate radio spectrum policy approaches, spectrum availability issues, harmonised usage conditions and efficient use of spectrum within the framework of radio spectrum policy in the Community, a liaison should be established between the activities of solving PLC interference issues in the EMC context with the bodies dealing with radio spectrum policy matters pursuant to the Radio Spectrum Decision.

4. Although market access and choice of technology are for market players to decide, it would seem that modern equipment minimises the risk for Member States, market players, and indeed for users if and when an interference situation would occur. In order to minimise unwanted emissions and the risks of causing interference and resolve interference situations, Member States should encourage powerline communication operators to use state-of-the-art communications equipment, causing the lowest possible emission levels and able to adapt to interference situations, e. g. by creating notches, and ensure symmetrical implementation of PLC networks.

5. With regard to the technical interpretation of the requirement of the EMC Directive for PLC equipment, it is proposed to establish the measurement method and emission limits effective and appropriate for powerline communications on the electrical power grids in use in Europe. An outline is provided in the Annex to this Working Document.

6. Member States need to make available to the European standards organisations any relevant data about interference problems and unwanted emission levels related to powerline communications networks. The European standardisation organisations should take due account of these data if and when revising the harmonised standard de-facto set by the Annex to this Working Document. This may include work on the interference model to be used. It will additionally allow a better understanding of how to act on networks in order to allow the most efficient use of these networks.

7. Member States are encouraged to report to the Commission on their experiences and to provide any relevant statistical data, including data related to interference problems, as regards the deployment and operations of powerline communications in their country. The Commission undertakes to provide timely reports on these developments.

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Annex: Radiated emission level of PLC equipment

The emissions from a PLC-equipment in the frequency range 1,6 MHz to 30 MHz shall not exceed the field strength level of [ ][5].

The limits are based on measuring equipment employing a CISPR quasi-peak detector function and a measurement bandwidth of 9 kHz. The quasi-peak measuring receiver shall be in accordance with subclause 4.1 of CISPR 16-1[6].

Measurements shall be made on an open field site and shall be performed at a minimum of three installations that can be demonstrated to be representative of typical installation sites.

To the extent practicable, the device under test shall be measured at the distance specified, which corresponds to the horizontal distance between the measurement antenna and the closest point of the equipment under test, support equipment or interconnecting cables as determined by the boundary defined by an imaginary straight line periphery describing a simple geometric configuration enclosing the system containing the equipment under test. The equipment under test, support equipment and any interconnecting cables shall be included within this boundary.

Measurements may be performed at a distance closer than that specified above; however, an attempt should be made to avoid making measurements in the near field. When performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor [ ][7].

The extrapolation method used shall be specified in the Declaration of Conformity together with the measurement data.

The draft network standard developed by the JWG ETSI/CENELEC establishes a level of 22,5 dBµV/m at a measurement distance of 30 meters. This figure is derived from CISPR22 (or EN55022) for telecom ports which leads to a limit for radiated emissions of 55,5 dBµV at a measurement distance of 3 meters (or 22,5 dBµV/m at 30 meters using the extrapolation factor in footnote 7).

CISPR 16-1:1999, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1: Radio disturbance and immunity measuring apparatus*

CISPR 18-3: 1986, *Radio interference characteristics of overhead power lines and high-voltage equipment. Part 3: Code of practice for minimizing the generation of radio noise* – "high voltage power line", section 3.2.5 establishes an extrapolation factor of 33 dB/decade. This gives an appropriate description of the mixed behaviour of a powerline between a line and a point source.

Measurements shall be performed at a sufficient number of radials around the equipment under test to determine the radial at which the field strength values of the radiated emissions are maximized. The maximum field strength at the frequency being measured shall be reported in the Declaration of Conformity.